

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: Patent Application of  
Vancura

Serial No.: 09/372,560

Filed: August 11, 1999

For: KNOWLEDGE-BASED CASINO GAME  
AND METHOD THEREFOR

Group Art Unit: 3711

Examiner: W. Pierce

**DECLARATION OF OLAF VANCURA**  
**UNDER 37 CFR 1.132**

Honorable Commissioner of Patents and Trademarks  
Washington, D.C. 20231

Dear Sir:

I, Olaf Vancura, do hereby declare that:

1. I am the Executive Director -- Games Development at Mikohn Gaming Corporation and the sole-inventor of the above-described invention. I received my Ph.D. in Physics from The Johns Hopkins University and was a post-doctoral fellow and an astrophysicist at the Harvard-Smithsonian Center for Astrophysics. I developed and for several years taught the Casino Gambling Course at Tufts University, which was very popular and received a nomination for "the best course at Tufts." For over a year, I served as a consultant to the gaming industry. I am the author of the book ***Smart Casino Gambling*** (334 pages, 1996, Index Publishing Group, Inc.) and co-author of the book ***Knock-Out Blackjack*** (179 pages, 1998, Huntington Press). I am the lead editor of ***Finding the Edge: Mathematical Analysis of Casino Games*** (441 pages, 2000, University of Nevada -- Institute for the Study of Gambling and Commercial Gaming) in which I authored a paper entitled "***A Computer Teaches Itself to Play Blackjack***" (*Id.* at pages 81-102) and co-authored a paper entitled "***A Study of Index Rounding in Card-Counting***" (*Id.* at pages 71-79). I have been

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a guest on several radio programs involving gambling. I have been: (a) filmed for several television programs involving gambling, including specials that have and will appear on The Learning Channel and the like; (b) interviewed for articles by The New York Times and Reuters, among other publications; and (c) featured in articles appearing in Discover magazine, Esquire magazine, and Casino Journal magazine. I have also (a) written cover articles for Casino Player magazine (November 1997 and October 1998 issues); (b) given an inaugural UNLV "Excellence in Gaming" Lecture (September, 1997); given an invited lecture as part of the Gaming Management Distinguished Speaker series at University of Nevada Reno (1997); given an invited lecture on the Probability and Statistics of Gaming at the Chance Lecture series at Dartmouth University (1997); given an invited lecture at the Casino Management Association (October, 1998); and (c) served as a member of the faculty for the UNR Executive Development Program (1998). I have chaired or served on panels discussing gaming related issues at gaming conferences. I am the inventor or co-inventor on several awarded gaming-related patents.

2. Prior to developing the invention described above, I was aware that slot machines in the United States are required by the various gaming authorities to respond to a random selection process such as a random number sequence from a random number generator, or the spin of a mechanical wheel in a random fashion. By way of current example, the Regulations of the Nevada Gaming Commission and State Gaming Control Board require that the gaming device "must use a random selection process to determine the game outcome of each play of a game" (§ 14.040 Paragraph 2).). For slot machines, the "mathematical probability of a symbol appearing in a position in any game outcome must be constant" (Id. at Paragraph 2b). This "selection process must not produce detectable patterns of game elements or detectable dependency upon any previous game outcome" (Id. at Paragraph 2c). Finally, it is mandatory that the gaming device "must not automatically alter pay tables or any function of the device based on the internal computation of the hold percentage" (Id. at Paragraph 5).

3. Recently, bonus games have been added to underlying slot machines. In a conventional bonus game, play on the underlying machine is temporarily stopped and the player participates in the bonus in a risk-free (i.e., no chance of net loss) manner. It is my belief that all such bonus games in the United States, including those in which the player makes a decision, retain and indeed rely upon an element of randomness in determining the game result. In the past 60 years, a large number of well-known television game shows have aired, most of which utilize knowledge as the primary element for player participation. As of today, the following well-known television game shows have been adapted to the slot machine environment: Wheel of Fortune, Jeopardy!, Family Feud, and The Price Is Right. In each case, the adaptation includes the brand name, trademarks, logos, and sound effects, and may include the likeness of the host. That is, the themes of the well-known television game shows have been adapted, but the element of player knowledge (wherein the player answers) required in the actual television show is entirely missing. I am familiar with the prosecution of my patent application, I earlier provided articles on the following two examples to the United States Patent and Trademark Office: Jeopardy! and Family Feud. Knowledge of the answer by the player in the play of these casino bonus games has no effect (nor can the player even input such an answer based on the player's knowledge). I believe the games suffer in this regard.
4. I don't know why knowledge-based games haven't been incorporated into casino slot machines in the United States. I surmise that game designers never understood how to ensure commercial viability, i.e., an assured rate of win for the house, against a player with perfect knowledge (or a team of players), and/or preserve fairness of return, i.e. an equitable game with a non-prohibitive rate of loss, against a player with no-knowledge. The problem, as I saw it, was how to achieve both of these goals under requirements of independence and randomness in determining the game outcome for each play of a game. It was my objective, which led to the invention described above, to provide casino games of chance that responded to answers based upon players' actual knowledge that satisfied these goals. In the specification, I carefully defined the words "skill," "game of chance," and "knowledge". As I stated therein, a game of chance is based on randomness in determining a result even in the presence of

skillful players. A knowledge-based game is one wherein a player's answers to questions, on an individual game basis, necessarily yields a result (e.g., incorrect on second answer) without any element of chance.

5. In preparation for this Declaration and to understand how others might have addressed the problem, I recently studied a number of additional British references which are submitted herewith. Some of these references are skill with prize (SWP) (no element of chance) and some are amusement with prize (AWP) (with element of chance or quasi-chance). In these British references (for example GB 2 253 569A (SWP); GB 2 188 182A (AWP); GB 2 185 612A (SWP); and GB 2 087 618A (AWP)), it is well recognized that there exists a problem of assurance of machine income against a knowledgeable player. The '569A reference, at page 1, articulates the knowledgeable player problem which it solves by continually changing the questions to prevent memorization of all the answers. The '182A reference, (page 1, lines 9-12) adjusts a prize based in part on a prize fund, related in turn to the amount paid in and the amount paid out in prizes in previous games. This has the deleterious effect that a player achieving the same score may not receive the same award (page 2, lines 21-22). The '612A reference discusses (page 1, lines 14-16) how machines can lose money against a "clever player." A method is cited (page 1, lines 20-33) whereby a machine monitors the income and expenditure from the machine and then stabilizes (i.e., to prevent bankruptcy) by altering the odds of winning. Alternate methods of monitoring income and expenditures to vary the difficulty of questions, the time limit to answer, or the prizes, are presented. The '618A reference continually monitors coin-in and coin-out and adjusts the frequency of a feature based on a comparison of coin-in and coin-out to a desired value. Thus, the long-term expectation of all players is identical (regardless of skill or knowledge). The instantaneous expectation (of an individual spin) is a function of the outcome of previous spins. This approach of machine stabilization represents an approach entirely against the teachings of my invention where no machine self-adjustment is required since, under my formulas, my set limits are fixed and the machine does not change as it would never face bankruptcy in the presence of a knowledgeable player (indeed, even in the presence of a perfect

knowledge player). In these references, to the extent that assuring machine income is discussed, I have concluded that "adaptive logic" is utilized. By "adaptive logic," I mean that the machine itself monitors past performance of wagers-in and payoffs-out in real time, and changes awards, probabilities of awards, and/or other relevant factors of future games to ensure commercial viability of the machine. In the United States, it is my belief that the British type of "adaptive logic" permitting changes (such as, e.g., reducing the probability of winning an award) based on wagers-in and pays-out is expressly prohibited by regulation (see Paragraph 2, above). In the United States, the selection process to determine each game outcome is required to operate in a random, independent manner from the preceding and following game outcome.

6. The first problem in obtaining my goal of designing the present invention was how to ensure commercial viability to the house in the presence of a perfect knowledge player or a team of players working together from cleaning out or bankrupting the house (Specification page 18, lines 5-8). This had to be accomplished under the regulatory guidelines requiring each game play to be the result of a random, independent process as imposed in the United States. My solution is entirely different than the adaptive logic approach which depends upon proactively monitoring and adjusting the game. My solution provides for a game which need not be monitored and need not monitor itself, as it provides a set house advantage for the perfect player for playing of the game (e.g., see page 11, lines 7-11, and page 17, lines 20-24) over all play of the casino game. The word "set" means that, in the presence of a perfect player, the house advantage is fixed at a limit, does not vary from spin to spin, and is mathematically based on random, independent events as produced, for example, in the random number generator 50 in Figure 1. This is repeatedly illustrated in my formulas and in my examples throughout the Specification. A perfect knowledge player (i.e., answers always correct) can never bankrupt the house under my invention.
7. The second problem in obtaining my goal of designing the present invention was how to provide a fair game to a player with no knowledge - i.e., provide a game

without a prohibitively high house advantage. The goal was to encourage such players to continue to play even though they were not always correct in their responses (Specification, page 17, lines 1-4). My solution provides a set house advantage for the player who always guesses at the answers. Again, the word "set" means that in the presence of a player who always guesses, the house advantage is mathematically fixed at a limit based on random, independent events as produced, for example, in the random number generator 50 in Figure 1. Again my formulas and my examples are provided throughout the Specification.

8. My mathematical formula of the house advantage is based on the player's expected return for the underlying game of chance such as a slot machine, the player's expected return for the knowledge-based bonus game, a known frequency rate for stopping the underlying game of chance, and the wager. I have solved both of the aforementioned problems for the player with perfect knowledge who always provides correct answers and for the player who always guesses and yet I preserved the random, independent events as fully set forth in my formulas. The resulting invention provides an instantaneous house advantage in a predetermined range between the set limits of the perfect player and the player who always guesses. Hence, a perfect player can never break the house as the house has a statistical house advantage that is preserved over time (Specification, page 17, lines 20-24). Yet, the player who always guesses is assured a fair return under a second statistical house advantage that is preserved over time. The instantaneous house advantage falls within this predetermined range and is a function of the actual knowledge of the player (Specification page 12, lines 4-8, 14-16). In one embodiment (Specification page 21, lines 23-25) questions are randomly re-used, and there is an incentive for players to continue playing or "learning" the game, as their instantaneous and long-term expectation increases (although bounded by the predetermined, set limits) based on knowledge of the answers. The average house advantage, hence rate of winning, will fall somewhere in the predetermined range (Specification, page 12 lines 5-9). These formulas (i.e., Formulas 1, 2, 3, 4, 5, 6,

7, 8, and 9) provide pre-calculated values that are fixed (i.e., set) for a given game and do not depend on previous play outcomes.

9. I have analyzed the Keller Jr. reference (U.S. 5,718,429). Keller is not a casino game that requires a statistical house advantage based on random events. Keller "sells" tickets preferably in the form of "chips" to create the "ambiance" of a casino (col. 2, lines 4-6 and lines 63-67). I believe Keller has no house advantage as used in our application; instead a fee payment is made for the received entertainment. Although Keller is ambiguous as to manner of making money, I believe the intention is for the person conducting the entertainment to always be paid up front (col. 2, lines 8-10 and lines 59-61). A player at the Keller casino game (not a traditional casino game) who wins receives "tokens" which have no monetary value (col. 2, lines 35-38). These "tokens" are not monetary casino chips and cannot be replayed in Keller's casino game (col. 2, lines 39-42). These "tokens" are then played at separate skill games. I believe Keller is little more than an arcade game method wherein money is paid for "entertainment" services, and wherein two separate games are played, possibly ending in money being awarded. It does not teach a self-contained casino game of chance with a knowledge-based bonus game operative with conditions appearing in an underlying game of chance such as a slot game. It does not teach a predetermined house advantage in the manner conventionally used in casino gaming (and as used in my application). It does not teach my house advantage as a function of expected returns for an underlying game, or bonus game, frequency of the bonus game, and wager, nor would his method have any need to meet the rigorous requirements of a casino house advantage.
10. I have analyzed the Evans reference GB 2 197 974A and find it to be entirely silent on house advantage, fixed mathematical methods, and machine income. This reference teaches a conventional fruit machine with a look-up table 7 showing prizes for winning combinations of symbols on the payline, where in order to obtain the prize, a player must successfully answer a predetermined proportion of successive questions (page 4, lines 15-23). The player can only

receive the underlying game potential payoff upon successful completion of the skill game.

11. In the implementation of my invention, it was also a goal to reward players with incorrect answers to encourage play such as the following types of payoffs in the knowledge-based bonus game: (a) paying for all answers whether correct or not, at no risk to the player; (b) paying more for correct answers and less for incorrect answers; (c) paying more for correct answers and less for incorrect answers, wherein all pays are positive (non-zero); (d) paying more for correct answers and less for incorrect answers, wherein all pays are greater than the player's wager. One aspect of my invention is to reward, in a risk-free manner, players having entirely wrong answers in the knowledge-based game. This encourages players with little or no knowledge while also encouraging knowledgeable players to continue play at the machine. I am unaware of any knowledge-based casino game of chance that provides both of these features.
12. I have designed for the first time a self-contained casino game having a risk-free knowledge-based bonus game implemented with an underlying game of chance, wherein each play is a random event, and wherein the minimum possible house advantage (i.e., against a perfect knowledge player who knows all the answers) may be precalculated. I have also designed for the first time a self-contained game of chance with a risk-free knowledge-based bonus game, wherein each play is a random event, and wherein the maximum possible house advantage (i.e., against a no knowledge player who guesses at all the answers) may be precalculated. I have designed for the first time a knowledge-based bonus game that actually pays the player based on the correctness of the answer and provides an instantaneous house advantage that is a function only of fixed parameters ( $R$ ,  $f$ , and  $X$ ) and the player's current knowledge.
13. While the application covers many different embodiments, the first commercial embodiment to be offered, by the assignee of the present application Mikohn Gaming Corporation, will be "Ripley's Believe It or Not! Adventures in Trivia" (hereinafter "Ripley's"). The underlying game of chance is a multi-reel, multi-line,



self-contained video slot machine. Upon the appearance of two or more trigger symbols (i.e., the condition) left to right, starting with the left-most reel, and adjacent, on any active payline, the knowledge-based bonus game initiates. This casino game is based on the formulas disclosed in the Specification. A casino player will have the opportunity to earn greater payoffs in a casino game based upon the player's actual knowledge in the play of a knowledge-based trivia game, in part, utilizing Ripley's Believe It or Not! publications and the like. Yet, a player who doesn't know the answer but simply guesses, also obtains an award (if the correct guess, a higher award, if the incorrect guess, a lesser award, but in all cases an award greater than the wager). The Ripley's casino game has to date received regulatory approval for California, Connecticut, Iowa, Louisiana, Michigan Native Americans (i.e., compacted tribal gaming only), Minnesota, Mississippi ((i.e., compacted tribal gaming only), Missouri, New Mexico (Tribal) from Gaming Laboratories International, Inc. Other requests for regulatory approval are pending. With the debut of Ripley's, I believe that for the first time, a player of a casino game can use his/her knowledge to win more money in an environment wherein (a) the house does not worry about bankruptcy, and (b) the player doesn't experience a changing machine that monitors itself (i.e., changes odds, prize values, etc. as found in "adaptive logic" designs).

14. On April 24, 2001, I demonstrated a version of the Ripley's casino game to John J. Grochowski who is both a journalist that reviews new casino games and an experienced expert in casino games. I did not explain the mathematical theory of my invention, but I did demonstrate the operation of the Ripley's casino game. I asked him to provide a statement for the Patent Office, his voluntary Declaration is attached.
15. All statements made herein of my own knowledge are true, and all statements made on information and belief are believed to be true, and that the foregoing statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that my willful false statements or the like may

jeopardize the validity of the above-identified patent application or any patent issued thereon.

05/18/01

Date

Olaf Vancura

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